CLAIMS

1. A process for multivariate data analysis comprising the steps of:

using a computer in conjunction with a Gram-Schmidt orthogonalization process to determine normal Gram-Schmidt vectors corresponding to observable normal values of a plurality of normal datum where at least one of said plurality of normal datum has zero standard deviation;

computing abnormal Gram-Schmidt vectors corresponding to observable abnormal values of a plurality of abnormal datum;

computing a signal to noise ratio for said normal Gram-Schmidt vectors and said abnormal Gram-Schmidt vectors to obtain abnormal predicted values; and

using said abnormal predicted values for a future prediction.

2. The process of claim 1 further comprising the step of:

computing dynamic signal to noise ratios for said normal Gram-Schmidt vectors and for said abnormal Gram-Schmidt vectors.

3. The process of claim 2 wherein said dynamic signal to noise ratio, η_j is equivalent to:

$$\beta_j^2 / V_e \qquad (13)$$

where $\beta_j = [\sum_{i=1}^{t} M_i U_{ij}] / r$, M_i is the i^{th} value of said plurality of abnormal datum, U_{ij} is selected from the group consisting of: said normal Gram-Schmidt vectors and said abnormal Gram-Schmidt vectors, V_e is

$$\left(\sum_{i=1}^{t} U_{ij}^{\,2} - (1/r)\left[\sum_{i=1}^{t} M_i U_{ij} \right]^2 \right) \Big/ (t-1)$$

where i is an integer between 1 and t, and j is an integer between 1 and k.

4. The process of claim 1 further comprising the step of: comparing said abnormal predicted values to said observable abnormal values of said plurality of abnormal datum.

5. The process of claim 1 wherein said observable abnormal values are assigned.

6. The process of claim 1 wherein said observations on k variables relates to medical diagnosis.

7. The process of claim 1 wherein said observations on k variables relates to quality of a manufactured product.

8. The process of claim 1 wherein said observations on k variables relates to financial markets.

9. The process of claim 1 wherein said observations on k variables relates to voice recognition.

10. The process of claim 1 wherein said observations on k variables relates to TV picture recognition.

11. A process for multivariate analysis comprising the steps of:

using a computer to calculate Gram-Schmidt orthogonal vectors satisfying the equation:

$$U_1 = (u_{11}, u_{12}, .., u_{1n})$$
$$U_2 = (u_{21}, u_{22}, .., u_{2n})$$
$$.$$
$$U_k = (u_{k1}, u_{k2}, .. , u_{kn})$$

for a sample size n and observations on k variables, wherein the mean of said Gram-Schmidt orthogonal vectors is zero;

calculating for each of said Gram-Schmidt vectors has a standard deviation; and

calculating a Mahalanobis distance corresponding to each of the k observations that satisfies the equation:

$$MD_j = (1/k)\,[(u_{1j}^2/s_1^2) + (u_{2j}^2/s_2^2) + .. + (u_{kj}^2/s_k^2)]$$

where j is an integer from 1...n.

12. The process of claim 11 further comprising creating a Mahalanobis space database comprising Gram-Schmidt vector means, Gram-Schmidt standard deviations, Gram-Schmidt coefficients, and Mahalanobis distances corresponding to the k observations.

13. The process of claim 11 wherein said observations on k variables relates to medical diagnosis.

14. The process of claim 11 wherein said observations on k variables relates to quality of a manufactured product.

15. The process of claim 11 wherein said observations on k variables relates to financial markets.

16. The process of claim 11 wherein said observations on k variables relates to voice recognition.

17. The process of claim 11 wherein said observations on k variables relates to TV picture recognition.